

Creating A Winning Safety Culture

For over 20 years, NSL have been considered a leading provider of Training Services and Teaching Documents to the majority of International Oil Operators, Service Companies and Major Contractors worldwide.

Our portfolio offers clients a uniquely expansive range of products and services, from assistance with enhancing a safety culture, to a client's procedural needs. From an awareness level through to advising at the highest level by using our Site Competent Personnel and Technical Authorities; our portfolio includes:

- Handbooks, DVDs & Posters
- eLearning - Online Training or CD Delivery
- Practical Training & Competence Programmes
- Mechanical Handling Services

We are continually responding to industry's training requirements. The latest exciting new addition to our portfolio is:

Safe Packing & Handling of Cargo to & from Offshore Locations: eLearning



To assist with the roll out and support the latest revision of

the above, NSL, in association with the Oil & Gas UK workgroup for the safe packing and handling of cargo to and from offshore, have developed a completely new eLearning modular training programme. This is also supported by the delivery of Practical Training, a Safe Cargo Handling Pocketbook and a set of Cargo Handling Posters.

An Exciting New Project Being Launched: Subsea Rigging & Lifting: 5 Day Practical Training

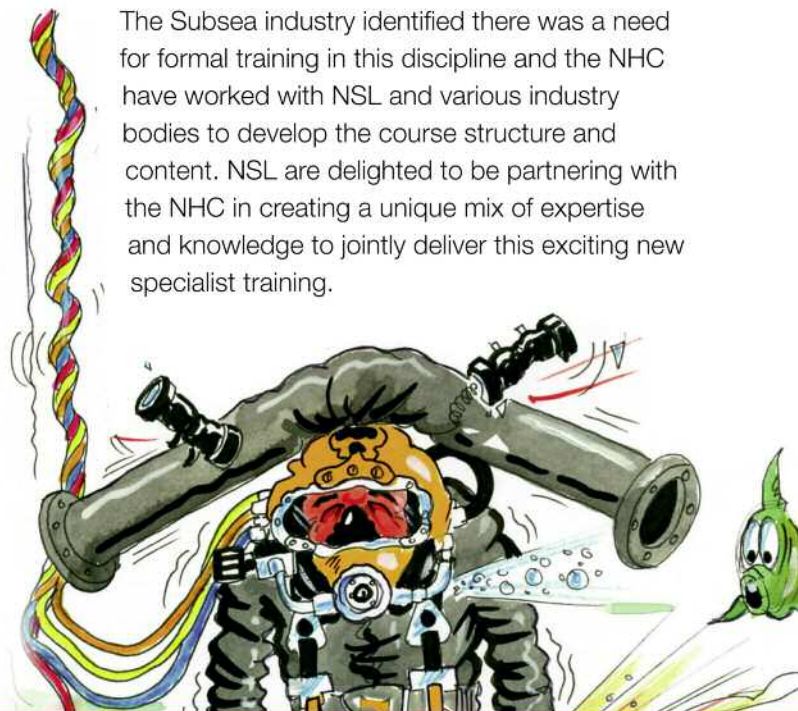


National Hyperbaric Centre

Specialist Diving Training organisation The National Hyperbaric Centre (NHC)

have partnered with NSL to develop a unique underwater course for teaching Divers, Dive Supervisors and Subsea Engineers about sub-sea lifting operations. The course covers the safe use of lifting equipment in the sub-sea environment, regulations, standards and industry best practice. In addition, delegates are required to complete complicated practical rigging and lifting exercises both in air and under water in the National Hyperbaric Centre's large dive tank.

The Subsea industry identified there was a need for formal training in this discipline and the NHC have worked with NSL and various industry bodies to develop the course structure and content. NSL are delighted to be partnering with the NHC in creating a unique mix of expertise and knowledge to jointly deliver this exciting new specialist training.



The benefits of flow meter customisation

By Charles Wemyss, Litre Meter Ltd



Litre Meter VFF flowmeters were installed on the Orlan Platform to help minimise production costs by accurately measuring the flow of corrosion inhibitor

There are several reasons why companies opt for customised meters but the most important is the 'bottom line' - the amount that can be saved in costs.

There are six common areas of customisation - high pressure, special connections, communication, application environment, low flow and flow range. Customising a meter from a standard range is usually carried out in one or more of these six areas in order to reduce the user's installation and operational costs.

High pressure:

Litre Meter has standard 100, 400 and 2,000 bar designs and rarely needs to produce meters beyond that range.

However, we have developed a customised VFF rotary piston flowmeter capable of operating at 4,000 bar (60,000 psi). This required a pressure balance chamber to isolate the internal components of the instrument from the high pressure conditions.

The meter was required for a US natural gas interstate supply pipeline in which the gas is pressurised at compressor stations located at intervals along the line. Reliable and continual operation of the pumping equipment is critical.

To keep the machinery operating reliably, a constant flow of mineral oil is pumped through it at a pressure of 4,000 bar (60,000psi) to ensure that it reaches every capillary. Litre Meter's flowmeter was designed to verify that the correct amount of lubricant is being passed through the machinery.

Special connections:

Another area of customisation is special connections. We are often required to adapt meters to meet very specific connection requirements but the cost to the customer is much less than doing the reverse - adapting equipment to suit a standard meter.

For example, VFF positive displacement flowmeters for installation on the Orlan Platform, on Sakhalin Island in Russia, are designed to help minimise production costs by accurately measuring the flow of corrosion inhibitor that is added to crude oil. If too much inhibitor is used it needs to be removed when the oil is refined, adding nearly \$5 to the price of a barrel of oil.

The inhibitor is added to the crude oil at rates of between 0 and 25 litres per hour through 2 inch diameter ANSI 2500 RTJ flanges. The combination of

low flow rates and a large diameter line is a particularly challenging application.

Many customers prefer to have connections of their own specification. The variety of threads and flanges available opens up a huge range of possibilities.

The LMX Pelton wheel flow meter which we shipped to Michelin for use in its tyre manufacturing operation in South Carolina provides another example. The meter forms part of a spray system that is used to jet hot water onto the rubber mixture to maintain a constant temperature as it passes through the production line. It precisely measures the amount of water in order to ensure consistency.

The meter can accurately measure low flows in a range of between 0.03 and 4.3 litres/minute. It has a custom-built 316 stainless steel cover and is supplied with ferrules and connector to enable it to be connected to Michelin's spraying system.

Communication:

Communication between the meter and customers' systems is crucial. Previously standard communication was either analogue or pulse output. Nowadays there is a range of computer protocols including Modbus, Canbus and RS232.

For example, Litre Meter is partnering with Sierra Instruments to supply a new touch-screen Human Machine Interface (HMI) for flow measurement in engine compression testing in the automotive industry. The HMI can be used in conjunction with a mass flow meter to automatically control testing processes and monitor variables such as the flow of gas in and out of cylinders.

The HMI communicates with the flow meter and the test system using the Modbus protocol, enabling the user to have full touch control over the testing process. It uses a touch screen with a mini control system to communicate with the flow meter.

Modbus was chosen as the protocol for this HMI because it is the most widely used communication protocol for industrial applications. Modbus enables reliable and low cost digital and wireless communication between instruments and other devices. It also includes an ethernet connection via Modbus TCP/IP enabling the effective connection of the instruments to programmable logic controllers (PLCs) and supervisory control and data acquisition (SCADA) systems.

Development costs are low and minimum hardware is required, as the system can be adapted to any operating system. In addition, Modbus is an open platform, available free of charge for download, and there are no subsequent licensing fees.

Application environment:

Meters sometimes require customisation to meet the requirements of a particular application environment. Among the most challenging of such environments is beneath the sea - particularly at great depths.

Subsea test requirements are easily the most onerous. Low flow VFF flow meters are frequently customised for this high pressure environment. The customisation specification has bespoke requirements including particle solution, vibration, electrical and heat cycling.

When one customer specified a connection type, pressure and a flow range for wash-water measurement, everything in a standard meter design was changed. The only part in common with any of Litre Meter's other meters was the bearing!



Delphi's automotive division in Spain uses custom-built flowmeters to test a range of petrol and diesel fuel injectors manufactured by the company

Low flow:

Litre Meter specialises in meters for low flow rate applications and we have entered into a research programme with Cambridge University's Department of Engineering to develop technology for positive displacement flowmeters capable of measuring flow rates below 0.003 litres per hour for water - the most challenging substance for this type of flowmeter to measure.

Our VFF positive displacement flowmeter is already capable of measuring down to 0.03 litres per hour at 2 cSt. The objective of the research is to understand the detailed behaviour of the instrument in order to increase further its dynamic operation.

The three and a half year study, costing £60,000, aims to understand more about the underlying physics behind the rotary piston flowmeter and how it behaves in low flow applications.

Factors such as weight of internal components, materials used, tolerances and surface finish, can all have an affect on a flowmeter's ability to operate in low flow conditions. The research is seeking to understand the best combination of these.

Flow range:

Many applications require meters to be customised to provide accurate flow measurement over a wide range of flow rates.

We recently supplied seven custom-built flowmeters to Delphi's automotive division in Spain. The instruments are being used to test a range of petrol and diesel fuel injectors manufactured by the company.

We created three bespoke versions of our Pelton Wheel flowmeter to accurately measure flow rates of gasoline when testing three different sizes of fuel injector. We also fitted special connections to the instruments so they would integrate with Delphi's test equipment.

The flowmeters have been designed to measure specific flow rates between 0.01 - 0.22 litres per minute, 0.03 - 3.9 litres per minute and 0.06 - 5.9 litres per minute to an accuracy of ± 2 per cent of measured value. They are rated at up to 40 bar.

Conclusion:

Customisation has become more complex than ever as instrument manufacturers have developed their technologies to provide more sophisticated communications, a wider range of connections and accurate measurements at higher pressures and over wider flow ranges - down to very low flow rates.

However, customisation results in cost savings in a variety of applications. It is well worth talking to instrument manufacturers about available customisation options before seeking to 'make do' with a standard instrument that does not fully meet the needs of the application. ■

Low flow



High flow



Whatever flow rate you are dealing with – and whatever fluid – Litre Meter has the meter for the job.

Call **0800 018 3001**

LITRE METER
Specialist flow measurement engineering

www.whatflowmeter.com